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by its results we must take into account all this subsequent history in our appreciation of Professor Pickering's achievement. But whether we do so or not is probably a matter of indifference to him, for the true observer is above all things an amateur, using the word in that splendid sense to which Professor Hale recently introduced us. There have been many attempts to define an amateur. One was given by Professor Schuster in his eloquent address to this section at Edinburgh in 1892:

We may perhaps best define an amateur as one who learns his science as he wants it and when he wants it. I should call Faraday an amateur.

We need not quarrel with his definition and certainly not with the noble instance with which he points it. But after all I prefer the definition of Professor Hale:⁸

According to my view, the amateur is the man who works in astronomy because he can not help it, because he would rather do such work than anything else in the world, and who therefore cares little for hampering traditions or for difficulties of any kind.

The wholly satisfactory nature of this view is that it provides not only a definition, but an ambition, and a criterion. We feel at once the ambition to become amateurs, for I deny stoutly that the distinction is conferred at birth: it comes with work of the right kind. And we may know what is work of the right kind by this if by nothing else: that by diligently performing it we shall become amateurs who find it impossible to stop: "who work in astronomy because we can not help it." Before an army of such men even the vast hordes of dusky possibilities of which we are beginning to catch glimpses must yield. The fight may seem, and no doubt is, without end; and the opportunities for glorious deeds by which outlying whole troops of the enemy are demolished at once are be-

coming rarer. We are confronted with the necessity of attacking each possibility singly, which threatens the stopping of the conflict through sheer weariness. Clearly the army of amateurs is the right one for the work: weariness can not touch them: they will go on fighting automatically because "they can not help it."

H. H. TURNER

SAMUEL HUBBARD SCUDDER

SAMUEL HUBBARD SCUDDER was born at Boston, April 13, 1837, and died at 156 Brattle Street, Cambridge, May 17, 1911, at the age of seventy-four years. He was, perhaps, the greatest American entomologist of his time. Whether we regard the mere mass of his work or its excellence or the breadth of view shown, we who belong to this later generation must stand amazed and humbled. Which of us can even imagine himself girding his loins for such a task as the "Nomenclator Zoologicus" or the great volumes on the "Butterflies of the Eastern United States"? Such things may now be undertaken cooperatively, or with much expert and clerical assistance; but Scudder was both architect and builder of his great works, responsible for everything, very rarely seeking collaboration, except for the purpose of gathering materials. I corresponded actively with him for many years, and have before me a pile of old letters and postal cards in the familiar handwriting. As I look them over I think of two especially prominent characteristics, his *enthusiasm* and his *kindness*. Herein he ranks with another famous entomologist, W. H. Edwards, who at one time wrote me almost daily concerning the progress and welfare of an interesting caterpillar I had sent him. It was not enough for Scudder to discover new facts or perceive new relationships; he must at once communicate them to those likely to be interested; and the charm of his letters, without the reserve natural to the printed page, must have warmed the heart and increased the zeal of many a younger man. May we, who now are obliged in such manner as we can to fill in the vacated ranks,

⁸ *Monthly Notices R. A. S.*, LXVIII., p. 64.

remember and imitate the splendid courtesy of the fine old men we have known!

I only saw Scudder once after he was stricken with paralysis, and his work was done. This was in 1907, at the time of the Zoological Congress in Boston. I was allowed to talk with him for three minutes only, but in those minutes he enquired after various old friends in the west, and looked at some new fossils from his old-time hunting ground at Florissant. He at once recognized the relationships of the fossil Nemopterid, although he had never seen such a fossil before; and being shown an excellent example of his own genus *Holcorpa*, said "that is a better one than mine." I mention these facts to show that his mind was still active, although he was physically unable to work and mentally incapable of any continuous strain. It is one of the most pathetic facts in the history of science that for seven years this great naturalist remained paralyzed and helpless, with so much of the work he had planned to do still unfinished.

Scudder's life was in many respects peaceful and happy, but he suffered much. Dr. C. J. S. Bethune has recently written the following:¹ "When the writer first came within the charmed circle of which Dr. Scudder was the center, some forty years ago, he and his young wife were living in Cambridge. Not long after, on account of her delicate health, they went to the south of France, and enjoyed for a time the balmy climate of the Riviera; but health was not restored, and soon the much-loved wife was taken away. Years after he experienced another bitter sorrow in the death of his only child, who had entered upon a physician's career with every prospect of attaining distinction in medical science." Scudder's son died of rapid tuberculosis, and I remember well when every letter, mainly about Orthoptera, would contain something about him. This loss came nearly at the end of Scudder's active life, and he never was quite himself again.

I have thought it useful to prepare a very brief chronological summary of Dr. Scudder's

life, in order to show in some measure the character and volume of his work.

1837. Born at Boston, Mass., April 13.

1857. A.B. at Williams College.

1858. Published list of terrestrial Mollusca found at Williamstown, in *Williams Quarterly*. This, his first published paper, appears to be his only one on Mollusca.

1859. Report to Boston Society of Natural History on the collection of insects of T. W. Harris. (First entomological contribution.)

1860. A.M. at Williams College. Index to Entomological Writings of T. W. Harris. (Hagen wrongly dates this 1859.)

1861. First paper on Orthoptera (*Proc. Boston Soc. Nat. Hist.*). North American *Pieris*; the first paper on butterflies.

1862. B.S., Lawrence Scientific School, Harvard University. Assistant to Louis Agassiz at Museum of Comparative Zoology (1862-64). Materials for Monograph of North American Orthoptera (71 pp.). Scudder's famous sketch, "In the Laboratory with Agassiz," was published in *Every Saturday*, 1874, and reprinted many times.

1863. Insect Fauna of White Mountains. List of Butterflies of New England.

1864. Became custodian, Boston Society of Natural History, and held this position until 1870.

1865. First contribution on fossil insects: Devonian [now considered Carboniferous] Insects of New Brunswick.

1866. First discovered fossil neuropterous insects in North America. Dragon-flies from Isle of Pines and White Mountains.

1868. Carboniferous (fossil) insects. Catalogue of Orthoptera of North America. Century of Orthoptera (1868-79).

1869. Edited Entomological Correspondence of T. W. Harris. New Orthoptera from the Andes.

1870. Scudder and Burgess on Genitalia of Nisus.

1871. Systematic Revision of some of the American Butterflies.

1872. Fossil Butterfly from France.

1873. Carboniferous (fossil) Myriapods.

1875. General Secretary of the American Association for the Advancement of Science. Historical Sketch of Generic Names proposed for Butterflies. Fossil Butterflies. Orthoptera from Northern Peru.

¹ *Canadian Entomologist*, July, 1911.

1876. Synopsis of North American Earwigs. Critical and Historical Notes on Forficulariæ.
1877. Elected to National Academy of Sciences. Tube-constructing Ground Spider from Nantucket.
1878. Rhachura, a new genus of fossil Crustacea (from Coal Measures).
1879. Assistant Librarian at Harvard (to 1882). Catalogue of Scientific Serials of all Countries. George Dimmock published "The Writings of Samuel Hubbard Scudder," enumerating 315 titles.
1882. Nomenclator Zoologicus (1882-84). This is a list of all the generic and family names proposed for animals, and is simply invaluable to the zoologist. Archipolypoda, a subordinal type of spined Myriapods from the Carboniferous.
1883. Editor of SCIENCE (to 1885). He also edited the entomological journal *Psyche* for many years.
1884. Paleozoic Arachnids.
1885. Paleodictyoptera (Paleozoic Hexapoda).
1886. Paleontologist to U. S. Geological Survey (to 1892). Published "Winnepeg Country, or Roughing it with an Eclipse Party," under a pseudonym.
1888. Paleozoic Cockroaches from Ohio.
1889. Butterflies of the Eastern United States and Canada, with special reference to New England (3 volumes). This is, I suppose, the finest work on any butterfly-fauna yet published. It gives a most elaborate account of every species, from all points of view, and is enlivened by dissertations on general subjects connected with entomology. It is also profusely and beautifully illustrated.
1890. Fossil Insects of North America: The Tertiary Insects. Tertiary Insects of North America. Bibliography of Fossil Insects. Hon. Sc.D. at Williams; LL.D. at Pittsburgh.
1891. Index to the Known Fossil Insects of the World.
1892. The Genus *Hippiscus*.
1893. Brief Guide to the Commoner Butterflies of the Northern United States and Canada. The Life of a Butterfly. Orthoptera of Galapagos Islands. The Tertiary Rhynchophorous Coleoptera of the United States.
1894. Vice-president of the American Association for the Advancement of Science. Tertiary Tipulidæ. North American Ceuthophili.
1895. Canadian Fossil Insects. Revision of American Fossil Cockroaches. Miocene Insect-fauna of Eningen.
1896. Mantidæ of North America. North American Nemobius.
1897. Revision of the Orthopteran Group Melanopli. Guide to the Genera and Classification of the North American Orthoptera.
1898. Alpine Orthoptera of North America.
1899. Revisions of Schistocerca and Myrmecophila.
1900. Adepagous and Clavicorn Coleoptera from Tertiary Deposits at Florissant. Catalogue of Described Orthoptera of the United States and Canada.
1901. Alphabetical Index to North American Orthoptera. (A complete guide to the whole literature of the subject to the end of the nineteenth century.)
1902. The last paper published: Scudder and Cockerell, List of the Orthoptera of New Mexico. Dr. Scudder's last scientific work was correcting the proofs of this paper.

Scudder's Taxonomic Work

Scudder's taxonomic work was characterized by great precision and clearness of statement. Everything was well arranged, and every pertinent fact clearly given. Localities and collectors were faithfully cited, and bibliographic references were exhaustive. It would be well if some of our writers of the present generation would study his methods, simply regarded as models of presentation. For certain of his views, Scudder was frequently attacked, but he did not enter into controversy. More especially, his treatment of the genera of butterflies aroused a great deal of opposition, for he upset much of the current nomenclature and divided up the old genera. To-day, much of this work is widely accepted, and while it is probable that several of his generic groups should not be regarded as valid, there remains no doubt that he was right in principle. He was, in fact, one of the pioneers in the movement for more precise classification, like Gill in fishes and Pilsbry in Mollusca.

It will be of interest to very briefly review Scudder's work in different groups.

Fishes.—While with Agassiz, Scudder worked on fishes, and prepared some manuscripts which he did not publish. Some of this

work was published by others, so that in the family Hæmulidæ two genera and one species are to-day credited to Scudder.

Crustacea.—*Rhachura venosa* was published as a new genus and species of fossil Crustacea, and is accepted as valid. For some reason, it is erroneously printed *Rachura* by Weller and others.

Arachnida.—One living spider from Nantucket was published, *Lycosa arenicola*. In 1904 this became the type of the genus *Geolycosa* Montgomery. Thirteen species of Paleozoic and thirty species of Tertiary arachnids were published.

Myriapoda.—Scudder published 32 species of Paleozoic myriapods and one from the Tertiary rocks. The work on the Paleozoic forms was very interesting and important.

Fossil Insects.—The following figures are obtained by going through Handlirsch's great work on fossil insects, and my own (1909) list of the Tertiary genera. In the latter paper five genera of Canadian Homoptera are accidentally omitted.

	Genera	Species
Carboniferous	44	116 ²
Permian	5	76
Lias		6
Jura	5	23
Cretaceous	2	2
Tertiary	177	838
Quaternary		83
Total fossil insects	233	1,144

Although Scudder had the reputation of being an excessive "splitter" as to genera, it is to be noted that Handlirsch has actually proposed 33 new generic names for or including Scudder's Carboniferous species.

Having myself done much work on fossil insects from Florissant, where Scudder obtained so much of his material, I can testify to the general excellence of his work, while its amount is simply astonishing. He made some mistakes, and certainly described a number of specimens which were too poorly preserved to be satisfactorily classified; but he was to American paleoentomology as Leidy, Cope and Marsh combined were to our vertebrate pale-

² Also four species later considered by Scudder to be the remains of plants.

ontology. Indeed there is little doubt that in respect to the proportion of good work to bad, or of valid genera and species to invalid, Scudder appears in a most favorable light in comparison with the great paleontologists mentioned.

Recent Insects

Orthoptera.—Mr. J. A. G. Rehn says: "He was the greatest orthopterist America has produced," a fact nobody could be found to dispute. On going through Kirby's "Catalogue of the Orthoptera of the World," I find 106 genera and 630 species credited to Scudder, and two additional species to Scudder and Cockerell. Most of these are North American, but many are exotic, especially from the Andes and the Galapagos Islands.

Odonata (dragon-flies).—Scudder worked only for a short time on dragon-flies, but the results were important. Muttkowski's Catalogue (1910) credits six species and one subspecies to Scudder.

Lepidoptera Rhopalocera (butterflies).—The work on butterflies was of the first importance, and has been referred to above. The description of new species was a quite minor aspect of it, but I find in the North American fauna nineteen species credited to Scudder, and five to Scudder and Burgess. There are also numerous subspecies or varieties. More important was the treatment of genera. Dyar's Catalogue (1902) gives 44 valid genera described by Scudder; but Skinner's later list, representing the ideas of the older school, recognizes only one Scudderian genus, though some others are accepted and wrongly credited to Speyer. In all, I find that Scudder described 1,884 apparently valid species of animals.

It remains to note that Scudder came of good stock, two of his brothers having attained eminence. The older (born 1835), David Coit Scudder, was a missionary of note, who died in India. His "Life and Letters" were published by Horace Scudder in 1864. The younger brother (born 1838) was Horace Elisha Scudder, well known as a writer of stories for children and other works, and later as the editor of the *Atlantic Monthly*. Vida

D. Scudder, also well known as a writer, is a daughter of David C. Scudder.

T. D. A. COCKERELL

SCIENTIFIC NOTES AND NEWS

DR. E. A. SCHAFER, professor of physiology at Edinburgh, has been elected president of the British Association, for the meeting to be held next year at Dundee, beginning on September 4. The meeting of 1913 will be held at Birmingham.

As part of the celebration of the centenary of the University of Christiania a number of honorary degrees were conferred upon the following American men of science: William Morris Davis, of Cambridge, geographer and geologist; William Lewis Elkin, of New Haven, astronomer; Albert Abraham Michelson, of Chicago, physicist; Henry Fairfield Osborn, of New York, paleontologist; Theodore William Richards, of Cambridge, chemist; Charles Doolittle Walcott, of Washington, geologist, and Ludvig Hektoen, of Chicago, pathologist.

THE Prussian gold medal for science has been conferred on Dr. Wilhelm Waldeyer, professor of anatomy in the University of Berlin.

DR. S. J. MELTZER, head of the department of physiology and pharmacology at the Rockefeller Institute for Medical Research, has been elected a member of the Imperial Leopoldina Carolina Academy of Naturalists, at Krakau.

WE regret to learn that Dr. Thomas Dwight, professor of anatomy at Harvard University, is seriously ill at his summer home at Nahant.

DR. CHARLES L. PARSONS, professor of chemistry in New Hampshire College since 1892, has accepted the position of chief mineral chemist in the Bureau of Mines, Washington, in charge of miscellaneous mineral technology. In the same bureau, Professor F. G. Cottrell, of the University of California, has been appointed chief physical chemist, in charge of the western metallurgical field.

THE Rockefeller Institute for Medical Re-

search announces the election of Dr. Theodore C. Janeway as a member of its board of scientific directors, to fill the vacancy caused by the death of Dr. C. A. Herter. This board has the entire control of the scientific work done by the institute. Its other members are Dr. William H. Welch, of Baltimore, Dr. Theobald Smith, of Boston, and Drs. L. Emmett Holt, Herman M. Biggs, T. Mitchell Prudden and Simon Flexner, of New York.

PROFESSOR GIES, Columbia University, was recently elected a scientific director of the New York Botanical Garden to succeed Professor Charles F. Chandler.

THE *Journal* of the American Medical Association states that a committee has been organized to do honor to the one who has been so largely responsible for the progress realized in the knowledge of diseases of tropical countries, Sir Patrick Manson, the movement for the international manifestation having been started in France. It is proposed to present him with a portrait medal, in gold, the work of Dr. Paul Richer, professor of anatomy at the Beaux-Arts in Paris. The forty-five members of the committee represent the leading countries of the globe; the list includes Drs. W. H. Welch, G. N. Calkins, F. G. Novy, C. W. Stiles and H. B. Ward of this country.

A DELEGATION named by Professor Alexander Smith, head of the department of chemistry of Columbia University, to represent the American Chemical Society at the National Conservation Congress in Kansas City the last of the month has been announced. It is composed of Professor E. H. Keiser, Washington University, St. Louis; Chancellor Samuel Avery, University of Nebraska; Professor Herman Schlundt, University of Missouri; Professor H. S. Bailey, University of Kansas, and Dr. H. E. Barnard, State Laboratory of Hygiene, Indianapolis.

THE president of the British Board of Education has appointed Dr. Francis Grant Ogilvie to the post of director of the Science Museum, which he will hold in addition to his present office of secretary for the Science Museum and Geological Survey and Museum.